STATE OF NEVADA
PUBLIC SERVICE COMMISSION

CARSON CITY, NEVADA
May 19, 1955

TO WHOM IT MAY CONCERN:

The records of the Public Service Commission of Nevada indicate the Virginia City Water Company's plant was constructed in 1872 to carry water through flumes and pipe lines from the High Sierras to Virginia City; that the water is obtained from three principal sources of supply -- Marlette Lake, the north flume, and the Hobart Creek Reservoir. Water from these three sources combines at a point above Eagle Valley in Ormsby and Washoe Counties, Nevada, is carried across the valley at Lakeview in high pressure siphons, and stored in a reservoir of about eight million gallons capacity; that the lines of flumes and pipes extend over privately owned lands and through sections of government land as is indicated on a map to be used in the acquiring of a right of way over these government areas. The lines across the government owned areas have been used for approximately 75 years and have served, at one time, a population of 40,000 people in addition to a great number of mines and mills.

The water rights of the Virginia City Water Company are at least 75 years old, and are in good standing at this writing.

PUBLIC SERVICE COMMISSION OF NEVADA

R A Allen

ROBERT A. ALLEN,
Chairman

Subscribed and sworn to before me
this 19th day of May, 1955.

Getty M. Blake

Notary Public in and for the County of Ormsby, State of Nevada

MY COMMISSON EXPIRES
AUGUST 5, 1958

VIRGINIA AND GOLD HILL WATER COMPANY
MARLETTE LAKE WATER SYSTEM

The Virginia and Gold Hill Water Company as early as July 1864, in their quest for additional sources of water, began consideration of utilizing water from the Sierra Nevadas. In May of 1872, Hermann Schussler, a consulting engineer from San Francisco, was retained to submit a report on developing water from the Eastern Sierras. This report provided the foundation for the development of this most needed Sierra water source for Virginia City and Gold Hill. In August of 1873 the first water from the Eastern Sierras flowed into Virginia City as a result of construction of the initial stage of the Marlette Lake Water System.

This first stage involved construction of a small diversion dam on Hobart Creek (headwaters of Franktown Creek), a 4.6 mile flume from this diversion dam to a siphon inlet tank, seven miles of 11-1/2 inch ID inverted siphon. (The thickness of this pipeline was designed to withstand a maximum pressure in excess of 800 psi. This was the greatest pressure withstood by a pipeline at this time in history.), approximately 9.7 miles of flume from the siphon outlet to the tanks above Gold Hill and Virginia City. When completed, this phase of the system could deliver approximately 2 million gallons per day of water to the Virginia and Gold Hill Water Company. The Virginia Evening Chronicle of August 7, 1873 had the following to say about this momentus event: "The pouring into this City and Gold Hill of a large stream of water from the Eastern Summit of the Sierra Nevada Mountains at 6:45 last evening marked an epoch in the history of the Comstock, and was the signal for a general jollification and rejoicing of 12 or 13 thousand people".

In 1875 a second 10 inch ID inverted siphon was installed, as well as another flume from the Hobart Diversion Reservoir to an additional siphon inlet tank. A second flume was constructed from the outlet of the 10 inch pipe to a newly constructed 5 million gallon reservoir known as Five Mile Reservoir. From Five Mile Reservoir a higher flume,7.3 miles long, was constructed to Virginia City and Gold Hill.

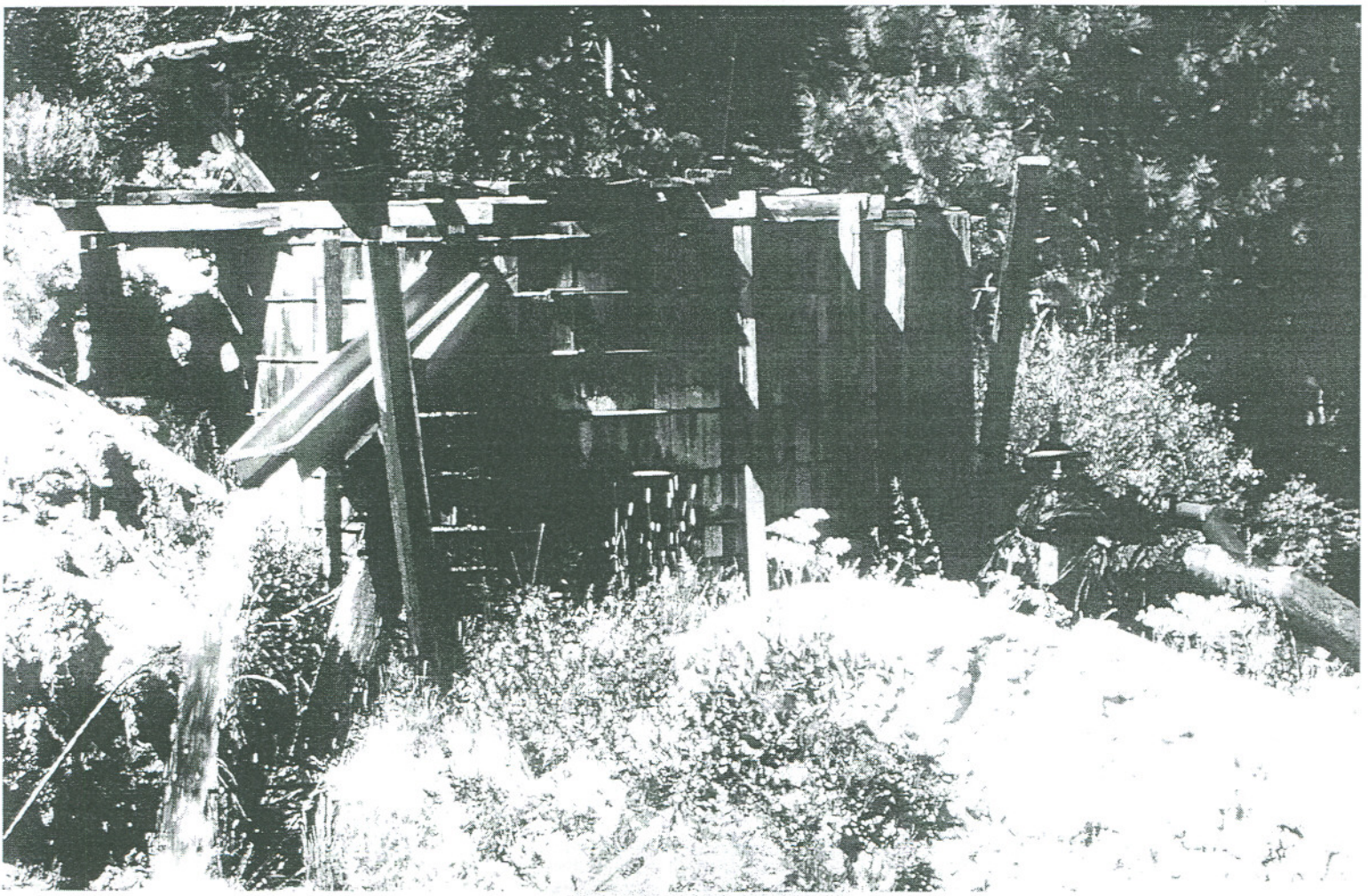
In July 1877 the Incline Tunnel, approximately 4,000 feet long, was completed through the Sierras along with 4.4 miles of flume from the Marlette Lake Dam to the west portal of the tunnel and a 2.8 mile flume from the east portal of the tunnel to the Hobart Diversion pond. These facilities allowed the introduction of Marlette Lake waters from the west side of the Sierras to the System.

About July 1887 a third inverted siphon of 11-1/2 inch ID was installed as well as a new flume from the Hobart Diversion Dam to the siphon inlet tanks. The flume from the east portal of the tunnel to the Hobart Diversion Dam was increased to handle the larger flow of water because of the construction of a larger flume from the west portal of the tunnel to Marlette Lake as well as a 9 mile flume to the Incline area to increase the system's total yield. Also, Hobart Reservoir was constructed to provide a 100 acre-foot impoundment structure at the headwaters of Hobart Creek. This reservoir is just upstream from the Hobart Creek Diversion Dam, more commonly known as Red House.

The total system cost was in the order of $2.2 million. The total delivery capacity of the System was in the order of 6 million gallons a day of water to the Virginia City-Gold Hill area.

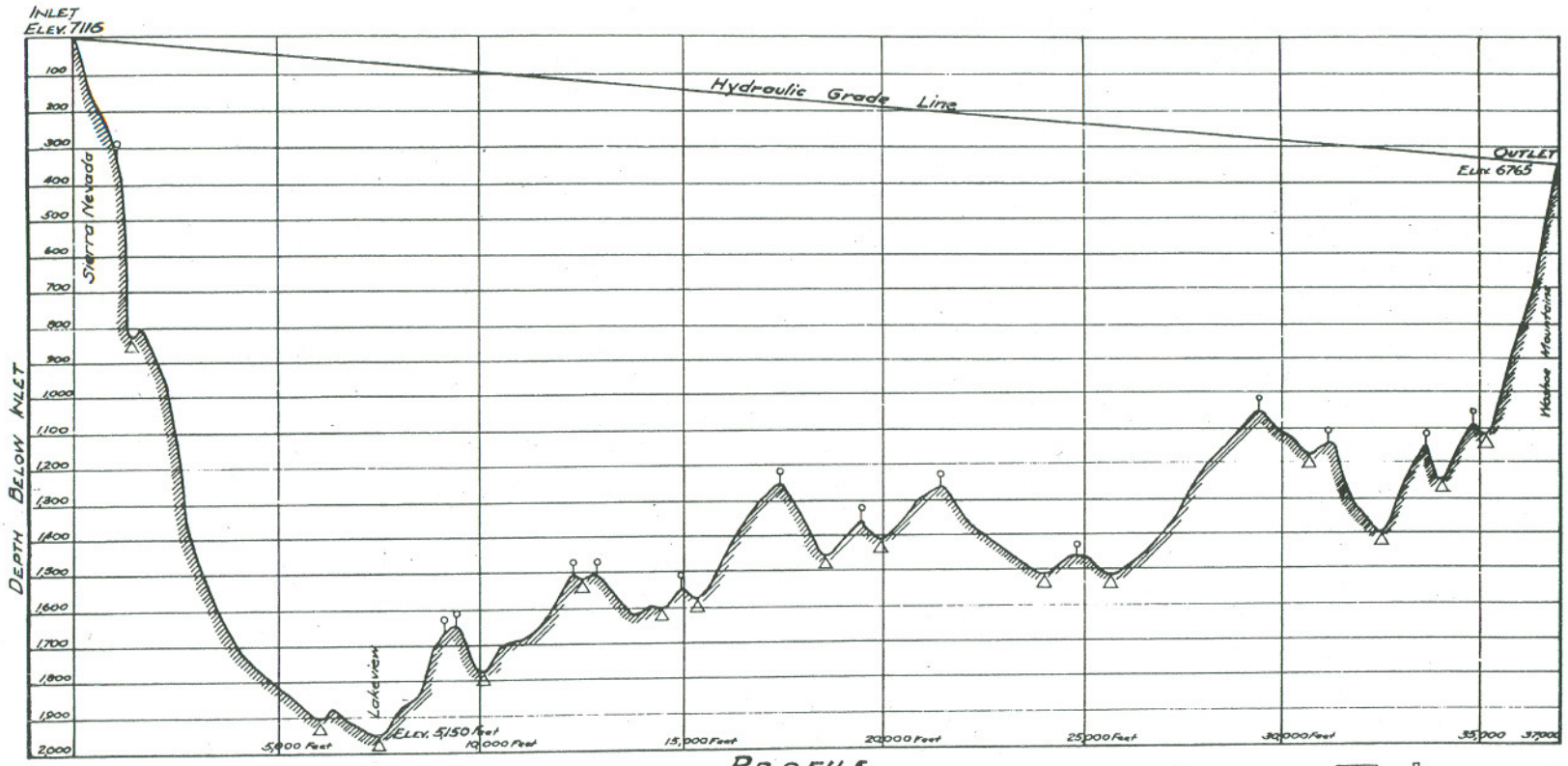
When completed, the Marlette Lake Water System consisted of 21.47 miles of pipelines, 45.73 miles of flumes, a 3,994 ft. tunnel and storage capacities of 6,154 acre feet in Marlette Lake, 100 acre feet in Hobart Creek Reservoir and 15 acre feet in Five Mile Reservoir.

The Marlette Lake Water System provided the necessary transfusion to the mining industry and its supporting population in the Virginia City and Gold Hill area when local waters became insufficient to accommodate the growing needs. The significant input of the Virginia City area to the nation's economy after the Civil War resulted from the fact that the mining industry was able to grow and prosper because of an adequate supply of water (The Comstock became the greatest producer of Silver and Gold high-grade ore in history.). Today Virginia City, whose only water supply is still from the Marlette Lake Water System, is known world wide and yearly receives thousands of visitors.



Redwood Tank where steel tank is now above Lakeview

Section of 1873 Pipeline between Lakeview Hill and Five Mile Reservoir. (Courtesy Hugh A. Shamberger)



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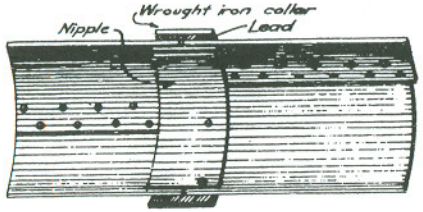

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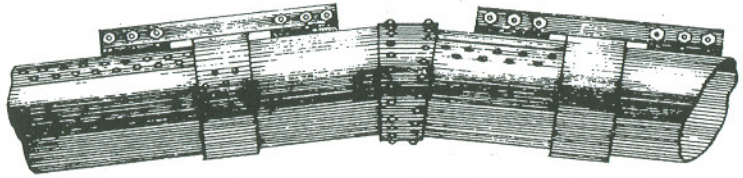
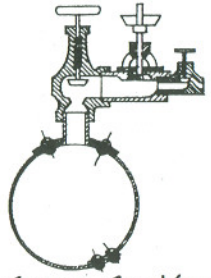


METHOD OF STRAPPING ELBOWS AND PIPES



SELF-ACTING AIR VALVE

VIRGINIA AND GOLD HILL WATER COMPANY

PROFILE AND DETAILS FIRST PRESSURE PIPE ACROSS WASHOE DEPRESSION 1873

Adapted from "Practical Treatise on Hydraulic Mining" by A.J. Bowie

San Francisco, Calif. 1939

J.D. Galloway
Civil Engineer

VIRGINIA CITY SIPHON

Water History at Lake Tahoe

by:

Julie R. Stone

Virginia City, the hub of the silver Bonanza, lay barren in the center of a semi-arid desert. Just as the need for lumber sent Comstockers to the Sierras, so did the need for water. Again, pioneering enterprise brought about extremely innovative methods and feats never before attempted.

Virginia City and the Comstock faced a variety of water problems with it first needing water to adequately supply its populace and second to power the steam-driven operation of the mines. The steam engines of the hoisting works required an inordinate amount of water in order to operate (Shamberger 1969).

At the first discovery of silver at the Comstock, Virginia City's water woes were not yet founded. Dan De Quille (1947) wrote, "In the early days, when the first mining was done at Virginia City and Gold Hill, natural springs furnished a supply of water for the use of the few persons then living in the two camps...These springs, and a few wells that were dug by the settlers, sufficed for all uses; as the town grew in population, an increased supply of water was demanded."

Two companies were formed to recover water from the nearby Virginia Range, the Virginia Water Company and the Gold Hill Water Company. Each outfit's first efforts brought water from tunnels dug for prospecting purposes and then collected in large wooden tanks to distribute to Virginia City and Gold Hill via a pipeline system. This system, however, failed shortly after the water tapped out. Wells were drilled even further into the west hills but again produced insufficient quantities to meet the needs. De Quille (1947) observed, "This [further tunneling] increased the supply for a time, but at length the whole top of the hill into which the tunnels extended appeared to be completely drained."

Necessity brought a consolidation of the two water companies on May 12, 1862. The Virginia Gold Hill Water Company (VGHWC) was formed with James M. Leonard as president. Leonard was further related in marriage to Walter Scott Hobart - an arrangement that would benefit both in the future when Hobart founded the Sierra Nevada Wood and Lumber Company (SNWLC) in 1877. Hobart was also on the VGHWC's board of directors.

The merger of the two water companies also consolidated their worries. Eliot Lord (1883:259) wrote, "Before September 1863, they had bought or leased the streams from seven tunnels, the principal water sources, and conducted them through flumes and ditches into large cisterns, from which the water was distributed to all points...The main first laid were wooden boxes, roughly joined, and placed on or near the surface, with branch pipes of lead tubing. In August 1863, iron supply pipes were laid in South 'C' Street and were thenceforth substituted for wood to a considerable extent. If the supply had be commensurate with the demand, the profits of the company would have been extraordinary, but the amount obtained was so scanty that it was necessary to dole it out at exorbitant rates."

It was noted just one month later that, only 56 ½ inches (664 gallons per hour) was available to Virginia City. A pattern began to emerge that the flumes and pipes ran full in the spring and half empty by autumn. It became evident to the water company that a great effort was required in order to locate and secure water from an unfailing source. When the VGHWC devised a plan to run water from a Sierra creek across Washoe Valley in the early 1860s, Eliot Lord (1883) reported, "even the boldest speculators were startled."

VGHWC took on the endeavor and the decision to go to the Sierra Nevadas for water was approved by the VGHWC board of directors in August 1871. VGHWC contracted two consultations to draft the undertaking. The first contractor, a civil engineer named S.M. Buck wrote his conclusions to VGHWC on July 14, 1864,"...to bring water across Washoe Valley at a sufficient height to make it available to supply Virginia City would, to say the least, would be one of the most arduous undertakings of engineering and mechanical skill in modern or ancient time...It is an undertaking in which no prudent capitalist would ever invest money" (Shamberger 1969).

The second consultation came from a German engineer named Hermann Schussler. Schussler had attended civil engineering schools in Zurich and Karlsruhe and came to the United States in 1864. He settled in San Francisco where he began work at the Spring Valley Water Works, and later became chief engineer. Schussler's resume also included his design and construction of the world's first pressure pipeline for the Cherokee Hydraulic Mining Company near Oroville, California, and most recently, his survey of the Sutro Tunnel on the Comstock (Shamberger 1969).

Schussler wrote his consultation to the VGHWC in October 1871," ...The following day we proceeded by way of Carson City to Lake Marlet (sic), the bottom of which is at an elevation of about 7800 feet above the Ocean and about 1200 feet above Virginia City. I found it to be a magnificent natural reservoir of an area from 500 to 600 acres. Its only outlet is a narrow gorge, 25 feet wide at the bottom and at an elevation of 20 feet, from 100 to 120 feet wide so that a log jam containing about 75,000 feet of timber...would make a reservoir containing about 4000 million gallons of water.

This reservoir will fill itself every winter from melting snow, in addition to its natural supply, which is over 100 inches per day at present. You would thus have secured a steady supply of 11 million gallons a day, which is 50% more than the entire City of San Francisco uses at present. The water can be easily brought around in either a northerly or southerly direction by means of a flume to the inlet of the pipe, the route by way of Dall Creek (Hobart Creek) being more preferable although it may involve the expense of drilling a short tunnel through the divide in the main ridge near Dall (Hobart) Creek"(Shamberger 1969).

With VGHWC board approval, Schussler submitted specifications and requisition of iron for pipe on May 18, 1872. One month later, June 15, 1862, he submitted specifications and requisition for a total number of 952,900 rivets for the pipeline. Schussler's specifications stated, "The pipe having a length of 6 1/3 miles (is) to be made out of sheets 3 feet square, double riveted in the straight seam and single in the round ones. That mile of pipe which has to resist the heaviest pressure [needs] to be made in San Francisco, hot riveted into 23 feet lengths"(Shamberger 1969). Schussler estimated the cost of the pipeline at around $100,000.

First Pipeline.

The initial project involved the construction of a diversion dam on Hobart Creek that conveyed water through a wooden flume 18 inches deep, 20 inches wide and 24,403 (4.62 miles) long to a tank at the inlet of the pressure pipe. The pressure pipe formed an inverted siphon that was 11 ½ inches inside diameter and 7 miles, 140 feet in length. The pipes ran at 819 pounds of pressure per square inch. Lindstrom (2001) reported, "This was a remarkable inverted siphon and was, at the time, the world's longest pipeline that operated under the highest pressure."

The pipes were fabricated at the Risdon Iron and Locomotive Works of San Francisco by cutting the plates and rolling them into a cylinder and lapping the edges enough to sufficiently permit "two lines of rivets to be driven, thus forming a 'double-riveted' longitudinal joint" (Shamberger 1969). The sections were then cut at about 36 inches long and joined to form individual lengths of pipe 26 feet 2 inches long. The traverse, or circular, seams between the 36-inch sections were overlapped and single riveted. The pipe weighed a total of 700 tons and stretched for 7 miles when installed. There were 1524 joints and one million rivets in the pipe and 35 tons of caulking lead was used.

The iron pipes were then boiled in a bath of asphaltum and coal tar, at a temperature of 380 degrees. They were coated inside and out with a layer of 20 percent asphaltum and 80 percent coal tar (De Quille 1947). The Risdon Works also tested the pipe at the foundry to a maximum pressure of 1400 pounds to the square inch (Shamberger 1969). Galloway (1947:69) wrote, "The design was a bold one when considered in light of modern practice, but the pipe was successful in withstanding the pressure."

The pipeline was a remarkable achievement in manufacturing and implementation. Fabrication began in March 1873 and was in place with water flowing through it just five months later. The 14.32 miles of wooden flumes, together with the diversion works on Hobart Creek were ready to convey water as soon as the pipe was laid. The first joint was laid on June 11, 1873, the last section on July 25, 1873 – just 6 weeks after ground had been broken for the project (Legislative Commission 1969). Shamberger (1969) wrote, "The laying of seven miles (and 134 feet) of 12 inch pipeline over very rough terrain in just six weeks was obviously a remarkably feat, keeping in mind that the motive power was men and mules." When completed the system carried 2.2 million gallons of Sierra water to Virginia City and Gold Hill a day.

Arrival of the first stream of water to the towns brought great celebration and jubilee.
The Virginia Evening Chronicle described the occasion in an article dated August 2, 1873, "The pouring into this city and Gold Hill of a large stream of water from the Eastern Summit of the Sierra Nevada Mountains at 6:45 last evening, marked an epoch in the history of the Comstock, and was the signal for a general jollification and rejoicing of twelve or thirteen thousand people. Bonfires and rockets girdled old Mt. Davidson for hours and cannon continued to roar until a late hour in the night. A stream of 153 inches of water (about 1717 gallons per minute) poured through the flume into Bullion Ravine, between this city and Gold Hill. The water was turned into the pipe on the Sierra at noon yesterday and reached here in six hours and forty-five minutes. It had been estimated that it would take the stream eight hours to reach here, a distance of

twenty miles, 134 feet.."Four months later, the *Mining and Scientific Press* observed, "It was an engineering feat of no small magnitude to carry this enterprise to a successful completion: and in view of the difficulties to be overcome, it will attract the attention of engineers all over the world." Yet, the Comstock roared on and soon 2.2 million gallons a day was not enough to fill the thirst of the growing operation, emerging mills and a population surge. Nearly two-thirds of the water supply was used on the Comstock alone (Galloway 1947).

A devastating fire that leveled Virginia City on October 26, 1875, taxed the system even more. The need of additional water available for firefighting was apparent as well. In two years, the first pipeline was tapped out, and a second was in the works. *The Gold Hill Daily News* reported on July 1, 1875, "The supply of water for milling and mining purposes has been gradually lessening for the past two weeks and if the utmost economy is not exercised in its use by our people, may continue to do so until even some of our mills may have to suspend operation. During the past week, the Virginia Consolidated Mill has lost four hours per day, for the want of a sufficient supply. The Water Company, wisely looking forward to such a necessity, has already got the placing of another line across Washoe Valley underway."

Second Pipeline

Construction of the second pipeline began on May 1, 1875, under the direction of Captain John Overton, and was completed in the same year (Galloway 1947). The National Tubing Company of McKeesport, Pennsylvania manufactured this pipeline. It's sections were wrought iron, 16 feet in length and one-fourth of an inch in thickness. The seams were lap-welded instead of riveted together and the joints were screwed together. It became the largest pipe ever manufactured in that manner in that day (De Quille 1947).

The pipe was 10 inches in diameter and designed to deliver 2 million gallons per day. The second pipeline closely followed the route of the first but was 1900 feet longer. A second flume from Hobart Creek to the inlet tank 25,005 feet (4.72 miles) long was built parallel to the first flume and a second tank was constructed. From the outlet, a second flume, 21,050 feet (3.98 miles) long was built to Five Mile Reservoir, so named by its distance from Virginia City. The reservoir had a capacity of 5 million gallons. A second flume was constructed from 5-mile reservoir 38,670 feet (7.31 miles) long to Virginia City and Gold Hill. Another reservoir to hold 2.5 million gallons was placed on the dividing ridge between Virginia City and Gold Hill (Shamberger 1969).

VGHWC Superintendent John Bear Overton was heralded as a hero in design and construction of this pipeline. The *Territorial Enterprise* lauded him in an article on August 17, 1875, "The controlling spirit in the planning and execution of the present work is Superintendent Overton, a man of tireless energy and limitless resources, he devotes himself with a remarkable self-sacrificing spirit and zeal to the interests of the Company: He superintends, personally, the minutest details of the great enterprise: is apparently everywhere at all times, infusing his own indomitable energy into the men employed on the work, and is the especial terror of shirkers.

He does not believe that anything is impossible in combating with the forces of nature. A modest and unassuming gentleman, he enjoys in a high degree the confidence of the Water Company, and had carte blanche to carry out his plans as seem to him most feasible and best. If the San Francisco Water Company people had half of Superintendent Overton's energy they would, long ere this, have had the water of Lake Bigler (Lake Tahoe) running into their city. Even now, we doubt not. Overton is mediating some plan to steal the waters of the beautiful lake and abduct them to this city."

The *Enterprise* was speaking about the planning and conception of a third pipeline. This one would stretch the VGHWC's veins from Marlette Lake in the Lake Tahoe Basin to thirty miles away in Virginia City. Marlette Lake was named after Seneca Hunt Marlette, 1824-1911, the first Surveyor General of Nevada. Marlette was a native of New York and graduated from Rensselar Institute as a civil engineer. He came to California via Cape Horn in 1849. There he surveyed in San Francisco and owned a mercantile business. He became Surveyor General of California in 1854 but moved to Nevada in 1860 (Farquhar 1966). Originally, the Marlette Basin was a meadow containing a small named Lake Goodwin. Schussler's report that he observed Marlette as a natural reservoir in 1871 was incorrect. A primitive wood and rock dam was constructed by the brothers Thomas and John Eliot to provide water storage for their Clear Creek Flume in 1863. By 1871, the lake covered 500 to 600 acres. Elliot's V-flume originated at Marlette Lake through North Canyon, south to Spooner Summit and east down Clear Creek Canyon into Carson City. On January 15, 1868, the brothers officially formed The Summit Fluming Company. Within one year the company had constructed twelve miles of flumes. In 1873, Walter Scott Hobart and Seneca Hunt Marlette open the Excelsior Mill in Little Valley. Two steam-powered saws cut a daily average of 25,000 board feet. It was the Excelsior Mill that cut the first boards and planks used for the VGHWC box flumes. Hobart was a State Senator from Storey County and a VGHWC board member. The Excelsior closed in

1878, however, Hobart and Marlette had new aspirations. That same summer they began building the Sierra Nevada Wood and Lumber Company (SNWLC) mill at Incline on Mill Creek. Operations began one year later, in 1879. Their lumber holdings were so extensive that the *California Illustrated Times* reported on December 25,1877, "...the number of acres of forest they own may be computed in the tens of thousands." Hobart actually owned approximately 55,000 acres of timberland in the basin that included Marlette Lake (Lindstrom 2000). With Hobart on the VGHWC board, obtaining water from Marlette was effortless.

The Carson Tahoe Lumber and Fluming Company (CTLFC) bought out the Summit Fluming Company operations in 1873 and acquired the Summit V-flume. VGHWC gave rights to CLTFC to appropriate water from Marlette for use in their flumes for a period of 10 years. Both VGHWC and CTLFC shared the expense of rebuilding the dam in 1873 to a 24-foot high dam of dirt fill and stone. Later, VGHWC raised the dam in 1875 to 37 feet and to 213 feet long and 16 feet wide. The lake swelled to about 2 miles long and ¾ miles wide and was said to contain 2 billion gallons of water (Lindstrom 2001).

Galloway (1947) wrote, "On the western side of the mountains a small lake, named after Marlette, had previously been made into a reservoir. Arrangements were made by which the Marlette Dam was raised. The exterior walls were dry rubble masonry with rough course laid stones. There is an interior core of earth to provide the necessary impervious element. There are 3825 cubic yards of masonry and 1365 cubic yards of earth in the dam."

Third Pipeline

Again, the Comstock pleaded for more water and VGHWC began construction on a third pipeline in 1876 - this one would originate from Marlette Lake. The pipeline ran essentially along the same route as the other two through the course of the Washoe Valley. It was also lap-welded but this time the joints were a converse lock type instead of screws. The walls were three different thicknesses at three-sixteenths, one quarter and three-eighths, the diameter remained at 11-1/2 inches and the length was 37,685 feet (7.15 miles). From Marlette Lake, a flume 14 inches by 30 inches in section and 23,175 feet (4.38 miles) in length, and the pipeline sat ready, but no water would run through it until a year later. The hold up was excavation of tunnel in which to run the flume from Marlette Lake to Hobart Creek.

The tunnel, excavated in granite, was 3994 feet long. Over half of the tunnel was timbered, its size being 7 feet high, 4-1/2 feet wide at the top and 6 ½ feet wide at the floor.
The tunnel's center is located 900 vertical feet below the crest of the Carson Range (Koerbe 1990). The *Territorial Enterprise* reported the procedure on August 17, 1875, "Tunneling is carried on from both end under the direction of John Simpson and Thomas Brown, both whom rank among the best miners on the coast. Newer drills of the Rand pattern are used for tunneling purposes. They are driven by compressed air, one engine doing the work for both ends, besides furnishing air for ventilation purposes.

In order to carry the compressed air to the west end of the tunnel, the engine being stationed at the east end...a string of iron pipe had to be laid over the mountain a distance of over a mile. About 150 feet of tunneling has been completed at each end, and it is thought that the entire work will be finished by next May (1876)." The connection was actually made May 13, 1877.

The Marlette Lake flume lead to the west portal of the water company's tunnel through the ridge that divides the Lake Tahoe drainage fro that of Hobart Creek. From the eastern portal of the tunnel a flume 14,610 feet (2.77 miles) long conveyed the water to a small diversion pond on Hobart Creek (now Hobart Lake). That same year, a new flume was constructed from the inlet of the three pipelines to Hobart Creek, and the original flume from the east portal of the tunnel to Hobart Creek was replaced with a larger flume.

In order to increase water supply, another flume (the North flume) was constructed that ran northwesterly from the west portal for a distance of nine miles to North (Third) Creek. This flume was 43,523 feet (8.25 miles) long (Galloway 1947). In addition to water from Third Creek, the flume picked up water from First and Second Creeks, Mill Creek, tunnel Creek, Incline Creek and other small streams along the way. This flume emptied into the Marlette Lake flume at the tunnel's west portal. The Territorial Enterprise stated on July 27, 1887 that to conserve the water supply and to have a reserve to

draw upon, a small storage reservoir was constructed on Hobart Creek about a half mile above where the flume from the tunnel emptied into it. The Hobart Reservoir dam was about 350 feet in length and 20 feet high, and the reservoir held about 35 million gallons, or about 100 acre-feet (Shamberger 1969). Capacity of all three completed pipelines into 5-mile reservoir was now 10 million gallons per day.

Flume: Marlette Lake to Tunnel.

Archaeologists have since discovered that two Chinese camps were at the West Portal giving indication that either VGHWC or SNWLC or both used Chinese to tend the tunnel and flumes. The SNWLC V-flume ran above the covered VGHWC box flume through the tunnel. When Archaeologist Arthur R. Koerbe surveyed the area on Jan 15, 1990, he found that in fact, two tunnels had been constructed, with one at a higher elevation than the other. His conclusion was that the VGHWC "obviously planned to use the upper tunnel, as the flume led directly to its West Portal and had a proper gradient. Even though the SNWLC was not incorporated until April 1878 and the lower tunnel was constructed in 1877 it would appear to be possible that superintendent Overton may have already known in early 1877 of the plans (of SNWLC) to incorporate.

If Mr. Overton did in fact know about the upcoming incorporation of the SNWLC, in his supervisory position it would appear possible that he could have arranged for the upper tunnel's use or construction to be abandoned and the lower tunnel constructed in its place. In this regard it should be noted that the lay-of-the-land where the Incline Railroad was located is such that the lumber unloading elevation was lower than the elevation of the West Portal of the upper tunnel and as a result the upper tunnel could not have been used by the (SNWLC) V-flume. The fact remains that the lower tunnel became the tunnel that was used for both the VGHWC's domestic water and the SNWLC's V-flume for transporting finished lumber and cordwood" (Koerbe 1990:14).

The VGHWC water system now included three reservoirs, over 21 miles of pressure pipes, approximately 46 miles of covered box flume and a tunnel. Marlette Lake's capacity held 6,154 acre-feet of water, Hobart Reservoir, 100 acre-feet, and Five mile Reservoir was 15 acre-feet. Total investment was in excess of $3.5 million (Lindstrom 2001). Water rates in 1880 were 20 cents per 1000 gallons to the mining companies and $4 per month to residents (Galloway 1947).

Throughout the system VGHWC employed year-round caretakers to tend the flumes and lines. Houses and stations were built for them at Marlette Lake, West Tunnel Portal, Hobart Reservoir (Red House), The Tanks, Lakeview, and at Five mile Reservoir. Red House also included a bunkhouse for workers that cut blocks of ice in the winter. An icehouse was also built for storage. Square blocks of ice were shipped from the reservoir to Virginia City via the flume and used in the cities and mines. Ice-cutting crews were mostly comprised of Washoe Indians and Chinese.

A telephone line connected all the VGHWC stations in 1878. The line originated at the (Marlette Lake) dam caretaker's house along the west side of the lake and terminated in Virginia City. It was established for key logistical communication between points within the elaborate water works network, including Red House, The Tanks, and the west and east portal of the tunnel. The line was in operation from the 1870s until 1957. The linear site consists of a line of widely spaced Jeffrey pines and associated telephone wire, ceramic and/or glass insulators, and occasionally small wooden boards/pegs attached to tree trunks. Connecting phone lines over a distance of 30 miles was considered a major achievement of its day (Lindstrom 2001).

James M. Leonard became superintendent of VGHWC in 1906 when Overton retired at age 80. Leonard continued

on until 1959, however, in 1940, he turned a large portion of the operation over to his son Hobart Leonard, born in 1916. Hobart Leonard became superintendent and president of VGHWC following his father's death in 1959.

On April 21, 1933, the VGHWC deeded all its rights in the entire water system to The Virginia City Water Company (VCWC). In 1941, the VCWC under the direction of Hobart Leonard removed the first pipeline (1873) and the third pipeline (1887) in the inverted siphon and used the pipe to replace the flume line from 5-mile reservoir to Virginia City. The Hobart Creek Reservoir dam had been partially washed out in a December 1955 flood was repaired in 1956.

Failures of the pipeline became severe in 1956-57 due its the advanced age. The VCWC had operated at a financial loss for many years and funds were not available to make necessary repairs and replacements. The Curtis-Wright Corporation loaned money to VCWC to replace the flume and pipeline from Virginia City to 5-mile reservoir. Curtis-Wright was then planning a large missile-testing program in Storey County under a government contract. The program involved the use of a large and stable water supply. At that time, the future of VCWC was uncertain, the equipment deteriorated, and no large financial means to restore it. Curtis-Wright then stepped in and purchased the entire system in order to ensure their operation's success in Storey County.

On August 8, 1957, the Curtis-Wright Corporation purchased from the Virginia City Water Company all water rights, storage facilities at Marlette Lake, Hobart Reservoir, flumes and pipelines up to and including 5-mile reservoir. Two years later, the company raised the dam at Marlette Lake an additional 15 feet, making the height 52 feet. The outlets from the dam consist of two 16-inch diameter pipes having a discharge capability of about 20 cubic feet per second (c.f.s.) each with a full reservoir. This increased the lake storage capacity from 2 to 3.4 billion gallons, or 10,400 acre-feet of water. This capacity was equal to three years of normal water production through precipitation and snowmelt from the area (Legislative Commission 1969).

Curtis-Wright deeded all its rights to their subsidiary, the Marlette Lake Company on December 2, 1957. A new 8-inch pipeline replaced the single remaining box flume from the outlet of the siphon to 5-mile reservoir (Shamberger 1969). The flume line from Marlette Lake Dam to the west portal of the tunnel had long been in disrepair. The company planned to replace this section with a pipeline and repair the tunnel.

In 1959, The State of Nevada contracted 1 million gallons of water per day and the Carson City Water Company 3 million gallons a day from the Marlette Lake Company. Marlette Lake had since become the principal water source for the State building complex at Carson City. The VCWC also contracted to receive water not to exceed 300,000 gallons per day. By 1963, the federal government contract for the missile-testing program of Curtis-Wright had failed to materialize and the company was no longer interested in their water supply program (Shamberger 1969).

On February 8, 1963, H.J. Knell of the Curtis-Wright Corporation offered to sell the assets of the Marlette Lake Company to the State of Nevada for $2 million. Edward Kruse, superintendent of Buildings and Grounds recommended purchase of the water system to Governor Grant Sawyer. After further negotiations, Marlette Lake Company settled at a price of $1,650,000.

The Nevada State Legislature approved an act authorizing the purchase of the Marlette Lake Company. The agreement was executed on June 12, 1963. The property consisted, in addition to all water rights held by the company, some 5378 acres of land, including 80 acres at 5-mile reservoir and 3.1 acres at Lakeview saddle where the 1873 VGHWC's caretaker's house still stood, road easements, flume and pipe easements.

Following acquisition by the state, improvements were made throughout the system.
An 8-inch aluminum pipe from Marlette to the west portal of the tunnel was laid, and an attempt to open the tunnel, which had collapsed in 1957, was made." An attempt was made in 1963 to force water through the tunnel by filling the easterly end of the tunnel with water from Marlette Lake. This attempt had considerable merit, as little was known about the cave-ins along the tunnel, and if they were not too high or were of sufficiently loose material, water could have been delivered to the west end of the tunnel at little or no expense. While this did not work, little was lost except time.

After the attempt to force water through the tunnel failed, a tunnel contractor was brought in to open the tunnel. Work was started at the easterly or lower end. It was discovered, after going into the old tunnel, that the cave-in had reached such a height that it was too expensive and impractical to try to timber and hold the present tunnel. A parallel tunnel through the faulted area was then begun but later abandoned"(Legislative Commission 1969:28).

In a December 21, 1964 letter, Howard E. Barrett, Dept of Administration Director stated to the Legislative Commission that "After unsuccessful attempts to run water into the west portal of the tunnel and to remove the material

blocking the flow of water, the contractor and Buildings and Grounds superintendent recommended the clearance of the tunnel from the east portal. The east entry was cleaned and faced. 60 feet of old tunnel was cleaned. A new tunnel of 312 feet was drilled as a by-pass to the old tunnel that was blocked. At the point where the new tunnel was to enter the old, a soft area was discovered and a slough off occurred. In order to again by-pass this slough-off and others that would probably block the old tunnel it is the recommendation of the contractor that an additional 480 feet of new tunnel be drilled. At this point the work on the tunnel has ceased, because of funds and weather. A total of $52,373.72 had been expended to open the tunnel" (Legislative Commission 1969).

With the failure of re-opening the tunnel, a diesel pumping station was added at Marlette Lake in 1966 to supply water to Carson City and is still in use during peak periods and drought. The old wooden flume from the east portal of the tunnel was replaced with a steel pipeline. Although the tunnel had caved in 1957, about 400 gallons per minute of water continued to flow from a spring within the tunnel. This water, along with local snowmelt and runoff is conveyed by pipeline to Hobart Creek. The wooden flume from the east portal to the Red House was replaced by pipe in 1968 (Legislative Commission 1969).

The flume system was fundamentally altered between 1900 and 1926 when all the boxes were rebuilt. The flume boxes were gradually abandoned or replaced with pipelines between 1941 to about 1974. The first replacement occurred in 1941, when the 1873 and 1887 siphons were scavenged and reused elsewhere (Shamberger 1969:43). The North Flume was abandoned in 1944 due in part from destruction of the diversion works on Third Creek, and the water rights were sold to the Franktown Irrigation Company (Shamberger 1969). Most box flume replacement activity occurred in the 1950s with Curtis-Wright acquiring the system. In 1969, the Tunnel flume was still in operation capturing water flowing from the collapsed tunnel and was not replaced with a pipeline until after 1974. The replacement of the tunnel flume ended the use of box flumes on the Marlette Lake Water System (Moore 1998).

At Red House, the 150 cubic yard of concrete diversion dam broke on Feb 13, 1912 killing two people. It washed out a second time in 1955. The Red House complex was partially stabilized by the Youth Conservation Corps for State Parks in 1978. The tanks at the end of the pipeline were two wooden tanks of about 9000-gallon capacity each. The foundation was originally excavated and the concrete poured by hand. The State replaced the tanks with concrete one after they burnt down in the Little Valley fire of 1981.

Marlette Today

Marlette Lake has been a main source of water to supply Virginia City for 130 years. A caretaker once resided year-round at the lake to tend the dam and flumes. The caretaker's residence was constructed during the 1880s. Structure foundations were destabilized when the lake was raised by Curtis-Wright in 1959. The lake was also the summer residence of the company superintendent between 1937 and 1957. Hobart Leonard and his family took up summer residence in a cabin (Chimney Beach) on the peninsula on the opposite shore of the lake. A stone chimney marks the site of the summer cabin today (Lindstrom 2001).

Convict work crews accidentally tore down the cabin in 1967, mistaking it for the caretaker's residence (the intended structure for demolition). The caretaker's residence was located on the west shore of the lake near the outlet and dam. The last caretaker at the station was Jack "Fergie" Ferguson. He traveled on bicycle to make his inspections, riding on top of the box flume boards. Ferguson had a boathouse at the south end of the lake where he built a 36' double-masted sailboat by hand. In 1952, a caterpillar with skid brought the boat out of Marlette to Spooner in a little over two hours.

The station complex comprised the caretaker's main residence, a stable/barn, blacksmith shop, summer and winter outhouses, and a large refuse dump. The flume alignment has since become a popular mountain bike ride, one with historical precedent (Lindstrom 2001:34).

Out of the entire engineering feat of the Virginia Gold Hill Water Company, only Red House and the Lakeview House remain today. The Marlette Lake Water System has been listed on the National Register of Historic Places since 1992. It consists of 1354 acres, 2 buildings and 12 structures. The American Society of Civil Engineers (ASCE) also designated the system as a National Historic Civil Engineering Landmark in 1975. Its conclusion from an impossible idea to a world wonder was best summed up in the 1969 Legislative Commission report, "The plan was bold, its accomplishment remarkable."

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Photo Credit: Nevada Division of State Parks Historical Archive

13. The Castle

In 1863 Robert Greaves, the superintendent of the Empire Mine, imported workmen and furnishings from around Cape Horn to fashion this European castle-style residence. In 1872 it was purchased by the president of the Gold Hill Bank, Mr. Blauvelt, and then passed to the McGuirk family, the present owners, in 1916. The house boasts a three-story tower with a breathtaking view of the surrounding area and has been kept in excellent condition throughout its history. Many of the original furnishings are still in the house and it is open for tours during the summer months.

From the Castle, backtrack down B Street to the A.M. Cole Mansion, the large white and brown structure on your left.

14. A.M. Cole Mansion.

This two-story Victorian mansion was built in 1887 by A.M. Cole, a prominent Virginia City pharmacist. Mr. Cole lived in the house until 1914 when it was purchased by the Crosby Company. The Crosby Company operated a large dry goods store which later branched out during the early 20th century into lumber and coal sales.

The wooden frame, hip roof structure is a well preserved example of Virginia City's prominent homes during this period. In 1933 Mrs. Ruth Sexsmith purchased the house and it remained in the Sex smith family until 1978.

15. Water Company Building.

Past the A.M. Cole Mansion is a white two-story building with a large cottonwood in front. Known as the old Water Company Building, it was built in 1875 to house the Virginia City and Gold Hill Water Company. The water company accomplished one of the major engineering feats of its time when in 1873 it completed a water system for the Comstock, piping water under enormously high pressure from a source in the Sierras, 19 miles across Washoe Valley.

NEVADA APPEAL

M/SUNNY 58°

Fixing the water famine in Virginia City

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August 6, 2006

Comments (1) Print Email

MARLETTE LAKE - In the 1860s, Virginia City had everything going for it. The town was built on a mountain of silver. People were coming from around the world to provide every manner of modern services to the miners and residents from world-class opera to the finest foods. There were even, finally, more churches than brothels in the town which would eventually top out at some 20,000 residents.

Only one thing was missing.

Water.

The town had long since outgrown the few natural springs on the surface, forcing the fledgling water company to drill into the tunnels west of town where water had been naturally flowing for several years.

But according to newspaper reporter Dan DeQuille, longtime chronicler of the Comstock, "at length, the whole top of the hill into which the tunnels extended appeared to be completely drained."

Virginia City still had water. But most of it was deep in the mines, scaldingly hot and laden with foul smelling, often poisonous minerals.

In 1862, the Virginia and Gold Hill Water Co. began to look for a permanent solution to the "water famine," which threatened to stunt the growth of Virginia City.

"The kind of development the Comstock wanted to pursue, they had to have a good water system," said State Archivist Guy Rocha.

"As far as their own aquifer, they had messed it up with all the mining. It was not healthy water."

It didn't take long to realize there was water aplenty in the Sierra Nevada above Lake Tahoe. The problem was how to get it across Washoe Valley to Virginia City.

That's where a Swiss-educated civil engineer named Hermann Schussler entered the picture. In seeking his help, the water company wasn't taking a chance on some unknown. Schussler was almost certainly the most prominent and innovative hydrological engineer in the west at the time.

As chief engineer for the Spring Valley Water Works of San Francisco, he designed the Crystal Springs Dam near San Mateo, Calif. That dam is still in place and, according to Rocha, is considered a prototype for the design of Hoover Dam.

According to Hugh Shamberger, author of the "Story of the Water Supply for the Comstock," one of the reasons Schussler was asked to help was his experience in designing building pressurized pipelines for Spring Valley Water Works and for the Cherokee Hydraulic Mining Co. near Oroville, Calif.

"He already had a tremendous track record," Rocha said.

The system he designed and built diverted water from Hobart Creek through a wooden flume 4.6 miles long to a tank above Washoe Valley. From there, the water entered a pressure pipe which dropped 1,997 feet to the saddle at Lakeview Hill, then climbed up more than 1,500 feet into the Virginia Range where the water again flowed into a flume that fed Five Mile Reservoir which supplied Virginia City and Gold Hill. The system was designed to survive more than 800 pounds per square inch of pressure at Lakeview and to make pumps unnecessary.

The water was finally turned on Aug. 2, 1873. The newspaper report of the event, again by DeQuille, said it took more than eight hours to fill. He reported the progress of the water as it surged through the pipe could be followed by the loud hiss as, one after another, valves designed to let pressurized air out of the pipe at the crest of each ridge were forced open, then slammed shut.

"At last, to the great joy of the engineer and all concerned in the success of the enterprise, the signal fire at the outlet on the summit of Virginia Range was for the first time lighted, showing that the water was flowing through the whole length of the pipe," he said.

Four months later, Mining and Scientific Press described it as an engineering feat and predicted the system would attract engineers from around the world.

Later a second and third pressure pipe were added to the system and flumes were built to tap Marlette Lake farther up the mountain as well as Hobart Creek.

At its peak, the system provided more than 20,000 residents in Virginia City with 10 million gallons of water daily.

Rocha said the system made full Comstock boom possible.

"This allowed Virginia City to prosper," he said.

Even more remarkable, he said, is the fact that the system is still supplying drinking water to Virginia City, Gold Hill and parts of Carson City.

• Contact reporter Geoff Dornan at gdornan@nevadaappeal.com or 687-8750.

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NEVADA APPEAL

M/SUNNY 60°

State approves funding for Marlette water system

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October 9, 2007, 4:01 AM

Comments Print Email

The Board of Examiners on Monday approved federal and local funding for the next phase of the Marlette Lake pumping station project.

The project is designed to improve the Marlette water system's ability to provide water for the capital city and Virginia City year round by building a permanent pumping station at the lake.

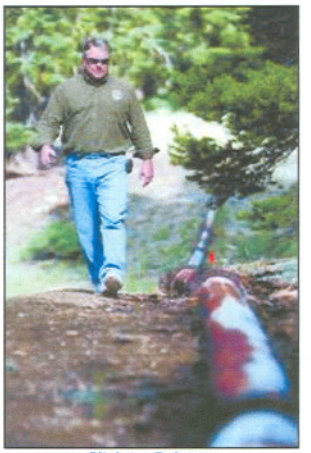
The board consisting of the governor, attorney general and secretary of state authorized the receipt and spending of $1,212,400 in funding from the Environmental Protection Administration and the Carson Subconservancy District to continue work on the project.

That brings total EPA funding to $1 million and the Subconservancy's contribution to $500,000. The state will provide the remaining $5.8 million for the $7.3 million project.

The historic system has provided water to the Comstock for more than 100 years. But when managers need Marlette water to augment the Hobart Reservoir supply in the summer, they have to haul a huge diesel pump up to the lake.

The diesel pumps the water from Marlette over the crest of the mountain and down to Hobart Reservoir.

Chad Lundquist/Nevada Appeal File Photo
Mike Leahy, water systems manager for the State of Nevada, walks a section of pipe between Marlette Lake and Hobart Reservoir Aug. 6, 2006. The state laid the pipe in 1963 from Marlette over the crest of the mountain and down the hill toward Hobart Reservoir.



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The old pipe installed in the 1960s actually ended 1,000 yards from the reservoir. The water simply ran downhill to Hobart from that point. It was replaced with an underground pipe this past summer.

Mike Leahy, who manages the lake and water system for buildings and grounds, said in an earlier interview the new pipe will not only enclose the water flowing into Hobart but eliminate problems with the existing pipe - such as the falling trees that occasionally shatter it. He said it will also get rid of diesel pollution and noise.

B&G Administrator Cindy Edwards said with the mobile pump hauled in every summer, system operators could only pump about four months a year. With the new, permanent pumping station, they'll be able to pump year round.

In addition, the ability to monitor and control the pump station by radio will greatly reduce the need to drive up the mountain - especially dangerous in winter.

When completed, Leahy and his crew will use electronics to monitor the system and make necessary

adjustments remotely unless there's a serious problem.

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